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GRASSLANDS OF SOUTH INDIA AND ITS ECOLOGY, FLORISTIC COMPOSITION AND UTILITY

S. CHINNAMANI*

INTRODUCTION

The grasslands of lower altitudes are mainly gregarious in nature and have SEHIMA in red-soils, DICHANTHIUM in Black soils, HETEROPOGON in degraded areas and are found in long stretches extending to several Kilometers. While the grasslands in the hills are a mixture of various species e.g. Nilgiri grassland which is mixture of CHRYSOPOGON, ISCHAEMUM, ANDROPOGON, ERAGROSTIS, etc. Natural grass is also a soil indicator e.g. ERIOCHRYSIS RANGACHARI indicates the peaty undrained soils of Nilgiris.

Grasslands of South India as exemplified by the typical Wenlock down, grasslands of Nilgiris, grasslands of Pulneys, Kanchas of Hyderabad District, Andhra Pradesh offer very pleasing scenic attractions. They also provide the best location for wild life of various species of birds, mammals and reptiles.

Protection of these grasslands from the expansion of agricultural lands and tea, coffee and other plantation and bad management due to over grazing have to be stopped for the benefit of the grasslands as well as protection of the rich South Indian Peninsular Grass Flora.

Natural Grasslands of South India occur under the stress of severe biotic conditions. Climatic climax grasslands do not exist except in Nilgiris which too is a controversial subject (1). The biotic conditions that these grasslands have to encounter are mainly annual burning, cutting, over grazing and expansion of agriculture lands and other crop lands. Due to the varied biotic interference, one can come across a cross section of various stages of succession from colonization to climax stage. Different edaphic stages of grasslands exist with definite grass association, showing the preference of typical soil condition by certain grass community. Sporadic occurrence of *Eriochrysis rangacharii* in Nilgiris indicates the peaty and ill-drained nature of the soil, *Dichanthium annulatum* indicates heavy clay soil, and *Sehima nervosum* well drained loam. Climate plays an important role in fixing the locality of a grassland type. As one encounters tropical, sub-tropical and temperate climate with varying rainfall of 500 to 5000 mm., under arid, semi-arid, humid and per humid tract, grass flora too varies. The typical examples of temperate grasses such as *Poa* and *Agrostis* can be seen at elevations above 2000 m at Pulneys and Nilgiris, while tropical species of *Sehima cenchrus*, occur at lower elevations. *Chrysopogon*, *Ischaemum* and *Panicum* are found at all elevations. Apart from the richness of floristic composition of these grasses in peninsular India, their scenic beauty is also unrivalled. The grasslands known as Kanchas in Hyderabad district have some beautiful grasslands of *Sehima* sub-type (5 & 6), and are one of the most beautiful grasslands in the plains of South India.

Grasslands types

The major grassland types found in South India are as follows :

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* Scientist (Plant Studies) and Head, Soil Conservation Research Demonstration and Training Centre, 'Patna House', Ootacamund— 643 001.

1. *Sehima—Dichanthium type* :—It is found in red and black soil regions of Andhra, Karnataka, Tamil Nadu (4, 5,6 & 8) and semi-arid tracts of Kerala. Under this, two clear subtype e.g. *Sehima* sub-type in red soils and *Dichanthium* sub-type in black soils exist with various stages of succession.

The important species of the *Dichanthium* sub-type grasslands are *D. annulatum, D. caricosum, Iseilema anthephoroides, Bothriochloa pertusa, Eremopogon foveolatus, Heteropogon contortus, Chloris barbata, Aristida setacea, Brachiaria eruciformis, Tragus biflorus, Dihebra retroflexa,* etc.

The important species of *Sehima* sub-type are *S. nervosum, Chrysopogon fulvus, C. asper, Eremopogon foveolatus, Bothriochloa pertusa, Heteropogon contortus, Aristida funiculata, Chloris barbata, Eragrostis, Perotis indica, Hackelochloa granularis,* etc.

2. *Dichanthium—Cenchrus type* :—It is found in skeletal and degraded soils of South India. Here, in addition to the grasses mentioned above *Cenchrus biflorus, C. ciliaris, C. setigerus, Cynodon dactylon, Sporobulus marginatus, Dactyloctenium aegyptium* are found. They are found in very drier part of the peninsular.

3. *Themeda—Arundinella type'* :—This type of grasslands are seen in the hilly areas between 600 to 1800 m elevation in the hills of Eastern and Western Ghats. The important species found are—*Themeda triandra, T. quardrivalvis, T. tremula, Chrysopogon fulvus, Heteropogon contortus, Bothriochloa* spp., *Arundinella* sp., *Agrostis, Sorghum halepens, Cymbopogon* sp., *Eragrostis* sp., *Cynodon dactylon,* etc.

4. *Andropogon polyptychus—Eulalia phaeothrix* :—This type of temperate grassland occurs above 1800 metre elevation in Nilgiris (9 & 10) and Pulneys and other parts of Western Ghats.

The main species are *Andropogon polyptychus, Eulalia phaeothrix, Arundinella purpurea, A. setosa, Themeda triandra, Chrysopogon zeylanicus, Ischaemum indicum, Tripogon bromoides, Eragrostis nigra, E. maderaspatana, Poa annua, Agrostis pilosula, Digitaria* sp., *Indochloa oligantha, Bromus* sp., *Brachypodium sylvaticum,* etc.

5. *General* :—In certain location, pure patches of *Imperata cylindrica, Saccharam spontaneum* and other *Saccharam* species occur sporadically. They fall under *Phragmites—Saccharam—Imperata* type which occur extensively in high rainfall areas of Assam and Uttar Pradesh.

Other pure gregarious patches of grasslands are those of *Cymbopogon travenchorensis* (2) in the hills of Southern Kerala and *Cymbopogon martinii* found in Telangana tract of Andhra Pradesh.

Economic Importance

The natural grasses of South India have a great economic utility (7) apart from its being a gene bank for the cultivated variety and can be effectively used for plant breeding. The main uses are as follows :

A. *Fodder* :—*Sehima nervosum, Chrysopogon fulvus, C. zeylanicus, Heteropogon contortus, Dichanthium annulatum, D. caricosum, Bothriochloa pertusa, B. folksii, Cenchrus ciliaris, C. setigerus, Ischaemum indicum.*

B. *Soil and Water Conservation* : (i) Contour bunds :—*Cenchrus ciliaris, C. setigerus, Cymbopogon* sp., *Cynodon dactylon, Bothriochloa pertusa* (ii) Bench terraces :—*Brachypodium sylvaticum, Themeda quadrivalvis, Ischaemum indicum.* Introduced grasses e.g. *Eragrostis curvula, Dactylis glomerata, Festuca elatior* are found to be the best. (iii) Grassed Water Ways :—*Bothriochloa pertusa, Panicum repens, Cynodon dactylon, Paspalum vaginatum.* Introduced grasses *Paspalum* *dilatatum, Pennisetum clandestinum* are also good. (iv) Gulleys :—*Arundo donax, Cymbopogon* sp., *Sorghum halepens.* Introduced species of *Tripsacum laxum, Saccharum munja,* Napier are also good.

C. *Oil yielding* :—*Cymbopogon travenchorensis, C. martinii, C. nardus, C. caesiius, Vetiveria zizanioides,* while *C. flexuosus, C. citratus,* is cultivated.

D. *Thatching* :—*Cymbopogon caesiius, Cymbopogon* spp., and *Eriochrysis rangacharii.*

E. *Medicinal Plants* :—*Desmostachya bipinnata, Cymbopogon schoenanthus, C. caesiius, C. nardus, Hackelochloa granularis, Vetiveria zizanioides* and *Bothriochloa odorata.*

F. *Lawn* :—*Cynodon dactylon, Pennisetum clandestinum* and *Axonopus compressus* are the introduced ones which have become naturalised.

G. *Paper making* :—*Saccharum spontaneum, Arundo donax, Themeda* spp., *Imperata cylindrica, Desmostachya binnata, Heteropogon contortus* and *Vetiveria zizanioides.*

H. *Weeds* :—*Hackelochloa granularis, Digitaria adscendens, Echinochloa colonum, Panicum repens, Setaria glauca, Aristida setacea, Cynodon dactylon, Dactyloctenium aegypticum, Eleusine indica, Eragrostis aspera, E. uniloides, E. nigra, E. maderaspatna, Tragus biflorus, Trachys muricata, Poa annua,* etc.

AESTHETIC VALUE

The general aesthetic value of natural grasslands is unparalled by any other vegetation. The grasslands present a different picture at different period of the year changing colour in relation to changes in the season.

The changes in the grasslands is briefly given below :-

Sehima—Dichanthium type

Pre-monsoon (April-May) :—During this period the grasses are dry and starts sprouting with the first showers. The general colour of the grasslands shows a mosaic appearance. A mixture of colours of brown, red, yellow and light green is due to dry foliage and sprouting of grass clumps with base brown soil and fully blooming trees of *Butea frondosa.* It provides a good subject for colour photography.

South West monsoon (June to September) :—This is the peak period of growth of grasses. With every shower of rain the grass grows by a few cm. The grasses reach peak period of growth in August-September with the tallest grasses reaching a height of 1 to 1.5 metres. Grasses show initial flowering in July end and reach full flowering by the end of August to 1st fortnight of September.

Dark green Characterise the landscape tinged with red orange and brown of the inflorescences. Back ground of trees with dark green foliage and rocky hillocks with *Euphorbias* and *Acacias* make a fine setting.

When mild breeze passes through the fully grown *Sehima* sub-type of grasslands, one can see passing waves as in a lake. This beautiful natural scene is punctuated and has to be carefully watched to enjoy, the dense *Sehima* plenty grasslands, in the flying out of qualis and partridges, jungle fowls etc.

In the *Hardwickia binata* forest of peninsular India exist (3) dense *Sehima* grassland at various stages of succession. Pure *Sehima, Chrysopogon fulvus* and *Heteropogon contortus* are beautiful to see. One such area lies 3 km from Ibrahimpatan of Hyderabad district, Andhra Pradesh.

North-East monsoon (Sept., Oct., November) :—Areas which fall under North-East monsoon e.g. Tamil Nadu and Nellore District of Andhra Pradesh, the grasses reach their peak growth by October.

All the grasses start fruiting by October and November. The seeds start shedding by the end of November. At this stage, one can see another 'face' of the grassland with the grasses slowly turning to red, yellow with tinges of green. The nutritive value is high at the time of initial flowering and very low after flowering.

Winter and Summer (Nov., Dec., Jan., Feb., & March) :—The grasslands show signs of aging up. They dry up, showing golden yellow, brown and tinges of red. The grasses by this times are either subjected to grazing or cutting. By the end of December, one can see only stubbles of grass clumps with exposed soil in between.

During summer the land is so barren that one can visualise that at the same place hardly a few months prevail a luxuriant grass cover.

In the end, the perennial grass remains dormant waiting for the first showers. While the annuals complete their life cycle by November-December shedding their seeds and the seeds wait for the rains to start the next generation. Perennial grasses have a life span of 5 to 20 years while annuals have a life span of 60 to 240 days.

Dichanthium—Cenchrus type

This behaves in the same pattern as *Sehima-Dichanthium* type.

Themeda—Arundinella type

This is found in the hills between 600 to 1800 metre in Western and Eastern Ghats.

Pre-monsoon (April-May) :—Due to good showers, good new flush of green leaves are seen. The colour variation is different. One sees, white, black, brown, red and light green. This is due to ashes and carbon residue resulting in the annual burning of the graziers and new sprouts of grass. The grassland provides a mosaic colour.

South-West Monsoon (June, July, August & Sept.) :—The grasses reach the peak stage of growth during August-September. Initial flowering occurs in July end. Peak flowering occurs during August, September. In these grasslands the inflorescences are usually large and conspicuous on the sloping ground of the hills. The grasslands invariably occur as Savannas mixed with deciduous forest. Grasses reach a height of 2 to 3 metre concealing wild life and birds. Even a tiger, panther or a deer gets blended and is very difficult to spot. Herbivorous wild animals mainly depend on these grasses for food.

North East Monsoon (Sept., Oct., & Nov.) :—In areas with North-East monsoon the grasslands reach the peak in October.

All the grasslands shed their seeds and spikelets in November and are seen with only remnants of inflorescence stalks.

Winter & Summer (Nov., Dec., Jan., Feb. & March) :—The grasses completely dry by the end of December. At higher altitudes of 1500 to 1800 m the grasses are killed due to frost and become golden yellow. It is a panoramic view. The grass though subjected to deferred grazing, deferred cutting, the clumps have taller stubbles left in the clumps. Inter-spaces have exposed bare soil. Annuals completely disappear.

The grasslands are subjected to annual burning from the first week of February. The whole area is spread with ash, black charred stubbles, exposed rocks and bare red patches of earth. The mosaic of colour is wonderful to view.

Arundinella polyptychus—Eulalia phaeothrix

These grasslands are found above 1800 m in Pulneys, Nilgiris, Anamalais and Kerala. These grasslands are one of the most beautiful grasslands in the world. Undulating topography with pockets of natural forest (Shola) and perennial streams with crystal clear water is one of the most enchanting sights in the Nilgiris.

The Wenlock downs in Nilgiris was subjected to grazing and had only *Chrysopogon-Ischaemum* sub-type grassland to a large extent. Most of these grasslands which were present a decade ago have been practically replaced by Bluegum, Wattle and pine plantation.

In the upper Bhavani and Avalanchi area one can encounter climax type of grasslands of *Andropogon polyptychus* and *Eulalia phaeothrix.* The grassland is dense 1 to 1.5 metre with full of organic matter. The whole area looks panoramic and dark green in colour.

Pre-monsoon (April-May) :—The grasslands look panoramic gives a mosaic appearance of red, yellow and light green. This slowly becomes dark green by the end of April-May with the good rains.

South-West Monsoon (June, July, Aug. & Sept.) :—These grasslands lie mainly in South-West monsoon belt and come to flowering in August to September. The inflorescence are of golden yellow colour in *Eulalia,* drooping and red panicles of *Chrysopogon zeylanicus,* erect reddish brown in *Ischaemum indicum, Andropogon lividus* and *A. longibes.* Ash coloured light yellowish brown inflorescence of *Andropogon polyptychus* provides a wonderful appearance.

One can stretch on these Wenlock downs and enjoy the scenic beauty, passing clouds, the distant lakes and beautiful flowers of ground orchids, campanulas and balsams. One has to be careful with the semi-wild Thoda buffoloes which move in herds and are always ready to charge. These green grassy downs have slender green snakes that move swiftly, but are not poisonous. Wherever habitations are seen *Pennisetum clandestinum* (Kikuyu) has invaded and forms a good lawn. This beautiful meadow must be visited by all Botanists.

North-East Monsoon (Sept., Oct., & Nov.) :—The grasses shed their seeds by end of October and first fortnight of November. Frost sets in the end of November killing the grasses.

Winter & *Summer* (Nov., Dec., Jan., Feb., & March) :—The frost in November kills all the annuals and dries the perennial grasses. With the first frost 25% of the area becomes yellow and with four to five frosts, the whole area becomes golden yellow due to the dry foliage. Though adequate soil moisture exists in November-December, frost kills the grass. The Frost continues up to February. The summer drought comes only in February-March. In February one can see hills after hills dry and golden yellow. Early morning in frosty days white ice of few cm thick can be seen over the grasslands, which melts away with bright sunshine.

The grasses become green only in April with the first rains.

Problems

The problems facing the grasslands are many :—1. Annual burning; 2. Overgrazing and cutting; 3. Conversion into agricultural lands, plantation of tea, coffee, and other crops.

Unless the grasslands are protected from these problems, these grasslands will slowly vanish. Our coming generation will not be able to see any true grasslands in peninsular India. Destruction of grasslands has a far reaching repercussion. With the extinction of grasslands, wild life will vanish. Innumerable dicot and monocot plants which are found in these grasslands will face extinction. Hence the grasslands have to be protected and preserved to safeguard the fauna and flora of South India.

CONCLUSION

The natural grasslands in South India fall under broadly five types. They are Sehima—

Dicanthium, Dicanthium—Cenchrus, Themeda—Arundinella, Andropogon—Eulalia and Imperate—Saccharum types. These grasslands have a rich flora and fauna. Grasslands of South India are facing extinction due to constant biotic interference endangering the great variety of flora and fauna. These grasslands are of great aesthetic value. They have to be protected and preserved as they are a great national asset.

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